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CORRELATION STUDIES IN A HYBRID POPULATION OF HEVEA BRASILIENSIS (WILLD. EX ADR. DE JUSS.) MUELL. ARG.

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Abstract

In sixty three hybrid clones of Hevea brasiliensis, comprising five cross combinations, correlations for juvenile yield and girth were worked out in the seedlings at the age of 18 months as well as in the early clonal phase at the age of 54 months. Highly significant positive association was obtained between juvenile yield in the seedlings and in their respective clones at the immature phase. Similarly girth in the juvenile seedlings and in the immature clones also exhibited significant positive association. Yield and girth showed significant correlation in the early clonal phase and is in agreement with the findings in the juvenile seedlings. Significance of these results for shortening the breeding and selection cycle in Hevea is discussed.

Introduction

The primary aim of any breeding programme is to evolve high yielding varieties with improved qualities. One of the main steps in breeding a potential variety is the identification and isolation of superior progenies from a variable base population. In Hevea the long duration of the breeding cycle poses a hindrance towards quick selection and release of cultivars. Conventionally the time required to breed and release new clones ranges from 30-32 years and it would be desirable to reduce this period. The present study is a critical examination of specific factors that contribute towards yield and of the reliability of the results in shortening the breeding cycle, in a hybrid population of Hevea.

National Symposium on New Trends in Crop Improvement of Perennial Species, 30 Aug 1990,

Materials and Methods

Sixty three genotypes of Hevea brasiliensis resultant of the 1982 hand pollination programme, comprising five cross combinations and the control clone RRII 105 were included in the study (Table 1).

Table 1. Hybrid progenies and their parentage.

Cross combination	Number of clones
RRII 105 x RRIC 100	25
RRII 105 x PB 5/51	3
RRII 105 x PR 107	4
GT 1 x RRIC 100	19
GT 1 x RRII 105	12
Total	63

The progenies were raised in the nursery as family blocks at a spacing of 30 x 30 cm during September 1982. The seedlings were test tapped consecutively for a period of five months commencing at the age of 18 months. Yield was recorded as gram per tree per 10 tappings. Girth was measured at a height of 20 cm from the ground. The seedlings were cloned and raised in polybags during July 1984. A small scale trial was laid out during July 1985 with one year old polybag plants of the 63 clones along with their parents and the control clone RRII 105. The spacing was 6 x 3 m. In order to assess the performance of the clones in the immature phase the trees were opened for tapping at the age of 54 months. Girth at a height of 150 cm from the bud union was recorded prior to the commencement

of tapping. Monthly yield was recorded by cup coagulation method. The mean yield over the first five months (g/tree/tap) was calculated. For statistical computation nursery yield was also converted to g/tree/tap. Correlations were calculated following Panse and Sukhatme (1967).

Results and Discussion

Significant positive correlations were observed between juvenile yield and yield in the immature phase and between seedling girth and girth in the immature phase (Table 2). These correlations ($r = 0.35^{**}$ for yield and $r = 0.36^{**}$ for girth) though significant were found to be low. However, it can serve as an early indicator

Table 2. Simple correlation coefficients between different characters.

	Yield in the immature phase	Girth in the immature phase	Juvenile girth
Juvenile yield	0.345**	--	0.488**
Juvenile girth	--	0.358**	--
Yield in the immature phase	--	0.290**	--

** Significant at 1% level.

in selection as suggested by Gilbert (1961) that even small correlations between two characters could have very important effects in selection. Positive correlation at 5% level of significance between nursery yield and small scale clone trial yield was observed by Ong et al. (1986) in a population resultant of hand pollinations, though in a few other hybrid progenies the association was found to be weak. They suggested that nursery yield could only be considered as a fair predictor of mature yield. Tan (1983) opined that nursery yield should be viewed only as an early guide in selection which has to be confirmed by

mature yield. Hence evaluation of clones in the immature phase assumes importance.

Clone-wise correlation coefficients between yield and girth of the 63 hybrids and the control clone RRII 105 (Table 3) exhibited clone to clone variation in the immature phase. 68% of the hybrid clones as well as the control RRII 105, showed significant positive correlation ranging from r = 0.58 to r = 0.85 between yield and girth, whereas the coefficient of determination ranged from 34% to 72%. This points towards the fact that 34-72% of yield variability between clones in the immature phase in the present population could be explained by girth at opening. However, in the pooled population the correlation through significant has come down to r = 0.29. This may be because of the non-significant association in 32% of the clones, which could be attributed to the heterogeneity of the population under study. Similar result was observed in the juvenile stage also (Licy et al., 1988). The above result indicates that based on yield and girth in the immature phase a fair degree of selection for further testing may be possible. Premakumari et al. (1989) observed a correlation coefficient of r = 0.55 (P 0.01) between immature yield and yield of first year regular tapping, with a gradual fall between yields of later years, in a seedling population. According to a study in Nigeria (Alika, 1980) correlation between year wise yield over an eight year period of tapping in the early mature phase, revealed that the correlation of first year yield with that in the second year was very high (r = 0.92) but dropped gradually with yield of third, fourth and fifth years after tapping. Ong et al. (1986) could select a few promising clones based on yield from 30 months old nursery seedlings. Tan (1978) suggested that selection based on early mature yield would be more effective than nursery yield. Promising selections could be expected by evaluation based on yield in the immature phase in the present population. These promising selections could be subjected to a further stage of evaluation, simultaneously evaluating the performance in the small scale trial. However, the reliability of early

Table 3. Correlation coefficients between yield and girth in the immature phase.

Clone	r value	Clone	r value
1	0.8375**	38	0.5778 NS
2	0.4736 NS	39	0.8129**
3	0.5091 NS	40	0.8054**
4	0.4611 NS	41	0.7457**
5	0.5454 NS	42	0.7122**
7	0.6485*	43	0.8149**
8	0.7993**	44	0.7119**
10	0.6893*	45	0.7961**
11	0.1186 NS	46	0.7707**
14	0.4923 NS	47	0.3901 NS
15	0.0198 NS	48	0.6969*
17	0.6389*	49	0.7151**
18	0.6097 NS	50	0.1340 NS
19	0.4243 NS	51	0.6345*
20	0.3945 NS	52	0.7403*
21	0.6152*	53	0.8078**
22	0.7057**	54	0.7342**
23	0.6399*	55	0.7114**
24	0.5419 NS	56	0.6589*
25	0.4965 NS	57	0.6491*
26	0.6512 NS	59	0.8477*
27	0.4512 NS	60	0.6137*
28	0.4049 NS	61	0.5499 NS
29	0.7188**	62	0.7367*
30	0.7556**	63	0.5952*
32	0.7819*	64	0.7729**
33	0.6146 NS	65	0.7506**
34	0.7826**	66	0.5843*
35	0.6106*	67	0.6884*
36	0.7442**	68	0.6484*
37	08275*	69	0.7864**
		70	0.7388**

*P 0.05; **P 0.01; NS - Not significant.

clonal yield in predicting mature yield has to be confirmed. The results, if found encouraging, may provide for earlier selection and may be of advantage in shortening the testing period by about six years.

Acknowledgement

The authors are grateful to Dr. M.R. Sethuraj, Director, RRII for providing necessary facilities for conducting the work. Also thanks are due to Smt. D. Premakumari, Anatomist, RRII for valuable suggestions.

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